AMENDMENTS TO CLAIMS

Claim 1 is amended as follows and Claim 6 is canceled.

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1. (currently amended) A method for forming at least one nanopore for aligning at least one molecule for molecular electronic devices or for forming a mold for deposition of a material, comprising:

(a) providing a substrate having a first major surface and a second major surface, substantially parallel to said first major surface;

(b) forming an etch mask on said first major surface, said etch mask comprising at least one nanoparticle;

(c) directionally etching said substrate from said first major surface toward said second major surface, using said etch mask to protect underlying portions of said substrate against said etching, thereby forming at least one pillar underneath said etch mask, wherein said directional etching is carried out using reactive ion etching;

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(d) forming a layer of insulating material on said etched substrate, including around said at least one pillar and at least partially covering said at least one pillar; and

(e) removing said at least one pillar to leave at least one said nanopore in said insulating layer.

2. (original) The method of Claim 1 for forming a nanopore array for either aligning or spacing molecules for electronic devices or for forming said mold, wherein: in step (b), said etch mask comprises a plurality of said nanoparticles; in step (c), a plurality of said pillars is formed by said directional etching; in step (d) said layer of insulating material is formed between said pillars and at least partially covering said pillars; and in step (e), said plurality of pillars is removed to leave said array of nanopores.

3. (original) The method of Claim 1 wherein said at least one nanoparticle has an average particle size within a range of about 1 to 10 nm.

4. (original) The method of Claim 1 wherein said at least one nanoparticle comprises an inorganic crystalline core covered with an organic layer.

5. (original) The method of Claim 1 wherein said at least one nanoparticle is formed by depositing a material of a first lattice constant on said substrate wherein said substrate has a second and different lattice constant to create a lattice mismatch and using forces from said lattice mismatch to form at least one nanoparticulate island of said deposited material.

6. (canceled)

7. (original) The method of Claim 1 wherein said insulating material is selected from the group consisting of oxides, nitrides, oxynitrides, diamond-like carbon, and insulating polymers.

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8. (original) The method of Claim 7 wherein said insulating material is selected from the group consisting of silicon dioxide, aluminum oxide, silicon nitride, and silicon oxynitride.

9. (original) The method of Claim 7 wherein said insulating material is formed by chemical vapor deposition or by liquid-phase techniques.

10. (original) The method of Claim 1 wherein said etch mask comprising said at least one nanoparticle is removed prior to forming said insulating material.

11. (original) The method of Claim 1 wherein in step (d), said layer of said insulating material is formed to completely cover said at least one pillar and following step (d), said layer of insulating material is reduced in thickness to expose a top of said at least one pillar.

12. (original) The method of Claim 1 wherein said layer of insulating material is reduced in thickness by chemical-mechanical polishing or by an unmasked single-step or multistep plasma/reactive-ion etch technique.

13. (original) The method of Claim 1 wherein said at least one pillar is removed by selective etching.

14. (original) The method of Claim 1 further comprising filling said at least one nanopore with said material.

15. (original) The method of Claim 14 wherein said material comprises a molecular species.

16. (original) The method of Claim 14 wherein the bottom of said at least one nanopore is electrically conducting.

A1 cont'd

17. (original) The method of Claim 16 wherein said bottom of said at least one nanopore is made electrically conducting by using as said substrate a material that is electrically conducting.

18. (original) The method of Claim 17 wherein said substrate comprises doped single crystal silicon or a doped polycrystalline silicon layer on said substrate.

19. (original) The method of Claim 14 wherein prior to filling said nanopores, the bottom of said nanopores is covered with a thin tunnel barrier.

20. (original) The method of Claim 14 wherein said material comprises a material selected from the group consisting of semiconductor and magnetic materials.

21. (original) The method of Claim 1 wherein said at least one nanopore has a length of about 5 to 100 nm and a diameter of about 1 to 10 nm.

22. (original) The method of Claim 21 wherein said at least one nanopore has a length of about 10 nm and a diameter of about 1 nm.

23. (original) The method of Claim 1 wherein said substrate is selected from the group consisting of oxides, nitrides, oxynitrides, and carbides.

24. (original) A method for forming at least one molecule in a pre-selected orientation relative to a substrate, said method comprising:

(a) forming at least one nanopore by:

(1) providing said substrate having a first major surface and a second major surface, substantially parallel to said first major surface,

(2) forming an etch mask on said first major surface, said etch mask comprising at least one nanoparticle,

(3) directionally etching said substrate from said first major surface toward said second major surface, using said etch mask to protect underlying portions of said substrate against said etching, thereby forming at least one pillar underneath said etch mask,

A1. cont'd

(4) forming a layer of insulating material on said etched substrate, including around said at least one pillar and at least partially covering said at least one pillar, and

(5) removing said at least one pillar to leave at least one said nanopore in said insulating layer; and

(b) dispersing said at least one molecule in said at least one nanopore.

25. (original) The method of Claim 24 for forming a molecular array, wherein: in step (2), said etch mask comprises a plurality of said nanoparticles; in step (3), a plurality of said pillars is formed by said directional etching; in step (4) said layer of insulating material is formed between said pillars and at least partially covering said pillars; and in step (5), said plurality of pillars is removed to leave said array of nanopores and further wherein in step (b), a plurality of said molecules is dispersed, one in each said nanopore.

26. (original) The method of Claim 24 wherein said at least one nanoparticle has an average particle size within a range of about 1 to 10 nm.

27. (original) The method of Claim 24 wherein said at least one nanoparticle comprises an inorganic crystalline core covered with an organic layer.

28. (original) The method of Claim 24 wherein said at least one nanoparticle is formed by depositing a material of a first lattice constant on said substrate wherein said sub-

strate has a second and different lattice constant to create a lattice mismatch and using forces from said lattice mismatch to form at least one nanoparticulate island of said deposited material.

29. (original) The method of Claim 24 wherein said directional etching is carried out using reactive ion etching.

30. (original) The method of Claim 24 wherein said insulating material is selected from the group consisting of oxides, nitrides, oxynitrides, diamond-like carbon, and insulating polymers.

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31. (original) The method of Claim 30 wherein said insulating material is selected from the group consisting of silicon dioxide, aluminum oxide, silicon nitride, and silicon oxynitride.

32. (original) The method of Claim 30 wherein said insulating material is formed by chemical vapor deposition or by liquid-phase techniques.

33. (original) The method of Claim 24 wherein said etch mask comprising said at least one nanoparticle is removed prior to forming said insulating material.

34. (original) The method of Claim 24 wherein in step (4), said layer of said insulating material is formed to completely cover said at least one pillar and following step (4), said layer of insulating material is reduced in thickness to expose a top of said at least one pillar.

35. (original) The method of Claim 24 wherein said layer of insulating material is reduced in thickness by chemical-mechanical polishing or by an unmasked single-step or multistep plasma/reactive-ion etch technique.

36. (original) The method of Claim 24 wherein said at least one pillar is removed by selective etching.

37. (original) The method of Claim 24 further comprising filling said at least one nanopore with said material.

38. (original) The method of Claim 37 wherein said material comprises a molecular species.

39. (original) The method of Claim 37 wherein the bottom of said at least one nanopore is electrically conducting.

A1 cont'd

40. (original) The method of Claim 39 wherein said bottom of said at least one nanopore is made electrically conducting by using as said substrate a material that is electrically conducting.

41. (original) The method of Claim 40 wherein said substrate comprises doped single crystal silicon or a doped polycrystalline silicon layer on said substrate.

42. (original) The method of Claim 37 wherein prior to filling said nanopores, the bottom of said nanopores is covered with a thin tunnel barrier.

43. (original) The method of Claim 37 wherein said material comprises a material selected from the group consisting of semiconductor and magnetic materials.

44. (original) The method of Claim 24 wherein said at least one nanopore has a length of about 5 to 100 nm and a diameter of about 1 to 10 nm.

45. (original) The method of Claim 44 wherein said at least one nanopore has a length of about 10 nm and a diameter of about 1 nm.

46. (original) The method of Claim 24 wherein said substrate is selected from the group consisting of oxides, nitrides, oxynitrides, and carbides.